

RESPONSE UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/530,694

The prior art: JP 09-312361 A Nakanishi et al (the English language equivalent, US Patent 6,045,927 Nakanishi et al, referred to as Nakanishi herein, is treated as equivalent and discussed herein); U.S. Patent 4,025,379 Whetstone; U.S. Patent 5,716,460 Manning et al (Manning).

The rejections: Claims 1 and 6 under 35 U.S.C. § 102(a) as anticipated by Nakanishi. Claims 1, 5 and 6 under 35 U.S.C. § 102(b) as anticipated by Whetstone. Claims 2-4, 7 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Whetstone in view of Manning.

The Examiner's position is set forth in the Action and will not be repeated here except as necessary to an understanding of Applicants' traversal of the above rejections, which traversal is now presented.

As a preliminary matter, however, Applicants have advised that JP-09-312361A contains disclosure which is, for all practical purposes, identical to the disclosure in U.S. Patent 6,045,927 Nakanishi et al (Nakanishi).

Turning now to their traversal, Nakanishi relates to a heat sink material, namely, a composite material for an electronic part, typically a semiconductor, in which heat-dissipativity in the direction of the thickness of a heat-transfer base plate is improved.

Quite in distinction to Nakanishi, the present invention relates to magnetic materials. This is an important point since Nakanishi does not in any fashion disclose magnetic properties.

Referring to claim 1 of the present invention, it recites "A method of producing a magnetic material having either a magnetized state or a demagnetized state..." whereafter the steps of the method are recited.

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Referring now to the present Office Action dated November 19, 2002, the Examiner states, at the top of page 3:

“In the instant case, the Examiner deems that the basic and novel characteristic of the invention is superior magnetic characteristics (page 4 and Tables 1 and 2) and there is currently no evidence of record that additional elements such as Ni would prevent the invention from still achieving “superior magnetic characteristics”. (underscore added)

Further, in the Action of June 5, 2002, page 3, first part of Paragraph 6, the Examiner states:

“Nakanishi et al. disclose a method of producing a magnetic material comprising the steps of...”,

whereafter the Examiner's view of the steps of Nakanishi et al. is recited.

However, Applicants respectfully submit that Nakanishi in no fashion discloses any magnetic characteristics for the Nakanishi material, rather, Nakanishi relates to a heat-dissipating material which is quite different and quite distinct from the field of magnetic materials. The Examiner is respectfully requested to point to any specific disclosure in Nakanishi which suggests magnetic properties in the sense of the present invention.

Further on this point, the magnetic material of the present invention is one which has either a magnetized state or a demagnetized state, and it is the essential nature of “structure” of the present invention and the the method of the present invention which yields a magnetic material in accordance with the present invention which exhibits such magnetic properties.

In the method of the present invention, the multilayer body is first prepared where layers “A” each consisting essentially of Fe having magnetism and layers “B” each containing a non-magnetic Cu group metal as the main component are stacked on each other. The multilayered

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body is then subjected to heating so that each of the layers "B" is partially divided by the dividing heat treatment. Then, cold plastic working of the body is conducted, whereby one obtains the magnetic material of the present invention. In the magnetic material of the present invention the coercivity thereof can be readily adjusted. Further, the "on or off" of the magnetized state or the demagnetized state is clearly exhibited while maintaining a high saturated magnetic flux density.

Thus, in accordance with the present invention, a "magnetic material" results by using the characteristics of each of the layers "A" and of "B".

The assignee of Nakanishi is the same as the assignee of the present invention. The heat-spreader of Nakanishi is based on the high thermal conductivity characteristics of Cu and the low thermal expansion characteristics of the Fe-Ni based alloy. Specifically, the low-thermal expansion layers called for in the claims of Nakanishi are formed of an alloy in which the thermal expansion coefficient is adjusted to have a low value, as disclosed at column 7 of Nakanishi. See especially column 7, lines 1-18.

Following the teaching of Nakanishi, since the heat which results from the silicon chip must be dissipated, it is necessary that the Cu provided at the side of the silicon chip be in communication with the heat dissipating side using passages. As discussed at numerous points in Nakanishi, to provide such heat-conducting passages, through holes can be provided in the low-thermal expansion layers. Viewing the type of assembly in Nakanishi as a metallic structure, the metallic structure would be one where the Cu material is more or less in the form of "nets" connected to each other (honeycomb shape) through the stacked low-thermal expansion

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layers of the Fe-Ni based alloy. Of course, the Examiner can see the type of "preformed" honey-comb structure in the Figures of Nakanishi. Such a metallic structure in Nakanishi bears little, if any, resemblance to the structure of the present invention in which layers "B" of the non-magnetic CU group metal, each having the shape of a sheet partially divided, are stacked on each other through the layers "A", each consisting essentially of Fe.

This major difference or distinction between the present invention and Nakanishi is due to the essential difference in the role of Cu in Nakanishi and in the present invention. In Nakanishi, Cu is used as a heat spreader, i.e., heat is dissipated via the Cu material in Nakanishi. To provide the heat-conducting passages which are made of Cu in Nakanishi, the low-thermal expansion layers of the Fe-Ni based alloy are divided by the through holes which are filled with Cu. Since the Cu layers connected to each other through the through passages or holes can thus provide heat-dissipating passages directed vertically to the layers of Cu, the Nakanishi structure makes it possible to dissipate heat in the X, Y and Z directions, thereby providing an excellent heat spreader.

In distinction, in accordance with the present invention, each of the Cu layers is partially divided. This partially dividing enhances the coercivity of the layers "A" consisting essentially of Fe, the layers "A" being indispensable to obtain the principle magnetic characteristics of the present invention. In the structure of the magnetic material of the present invention, the above Cu layers (the layers "B") hardly dissolve or intermix in the layers "A" (the Fe layers). This makes the Cu layers be present as a second discrete but divided (heat divided) phase in the structure and results in various advantages such as displacement of the magnetic walls and the

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rotation of the magnetic domains are minimized, with the result that the coercivity of the structure is enhanced.

Further, by subjecting the multi-layer structure to cold plastic working, anisotropy can be generated in the structure, and magnetic anisotropy can be obtained so that the coercivity, squareness and magnetization steepness are enhanced. None of these aspects of the present invention are remotely suggested in Nakanishi.

In summary, Nakanishi is directed to obtaining a heat conducting material which is compatible with the low-thermal expansion characteristics in the Nakanishi structure, and in no fashion does Nakanishi intend to obtain any magnetic material which has any relation to the present invention.

Applicants would now like to explore in more detail the chemical nature of the layers of the present invention. Layers "A" in the present invention are made of electromagnetic, mild iron (see the substitute specification, page 15, line 6 from the bottom of the page), Applicants advise such electromagnetic, mild iron has a composition similar to that of commercially pure iron. If Ni of an amount disclosed in Nakanishi were to be added to the "A" layers of the present invention which consist essentially of Fe, there could be concern about part of the Cu becoming partially dissolved in the layers "A" of the resulting Fe-Ni alloy because Cu can dissolve in Ni.

In accordance with the present invention, the material of the layers "B", namely Cu, must hardly dissolve in the layers "A", namely the Fe layers. See pages 7 and 8 of the substitute specification. Thus, in accordance with the present invention, materials which would

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substantially dissolve in the "A" layers are meant to be outside the scope of the material of the "B" layers. This must be compared to Nakanishi, as now explained.

In Nakanishi, Ni is an indispensable element to obtain the low-thermal expansion characteristics desired in Nakanishi. Specifically, Applicants advise that Ni in an amount of not less than 20 mass% is necessary to obtain the low-thermal expansion characteristics needed in Nakanishi, and it is impossible to obtain such characteristic when the Ni content is less than 20 mass %. Applicants base this in part on the discussion in Nakanishi beginning at column 7, about line 9. In distinction, in accordance with the present invention, it would be impossible that such a substantial amount of Ni (which can dissolve Cu) could be alloyed with Fe and be present in the layers "A". The reason for this is that it is indispensable that the Cu of the layers "B" be present as a single phase, albeit while being partially divided, so that the coercivity, etc., of the resulting final product may be enhanced.

Considering that Nakanishi obtains the desired low-thermal expansion characteristics by providing an alloy containing a high amount of Ni as above explained, quite clearly there is no suggestion in Nakanishi to reduce the amount of Ni and, thus, there is no motivation for one of ordinary skill in the art to reach a magnetic material as claimed in the present application.

In accordance with the present invention, it is indispensable for the layers "B" (Cu) to be present as a single phase and the same be partially divided. Contrary thereto, in Nakanishi the low-thermal expansion characteristic is obtained by adding Ni while using Cu in continuous shape. The substantial and unobvious differences between the present invention and Nakanishi are easily seen.

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Withdrawal of any rejection based on Nakanishi is requested.

Turning now to Whetstone, from the disclosure in Whetstone at column 1, lines 11 to 17, column 1, lines 18-20, etc., it is quite clear that Whetstone is directed to obtaining a soft magnetic material. Such a soft magnetic material cannot have any magnetized state in the absence of a magnetic field. This is quite distinct from the magnetic material of the present invention which has either a magnetized state or a demagnetized state in the absence of an external magnetic field, specifically, such a material has a semi-hard magnetic characteristic which can be classified as an intermediate property between a hard magnetic characteristic and a soft magnetic characteristic. Semi-hard magnetic materials are used for relays, switches, etc.

Quite clearly Whetstone cannot anticipate the claims of the present application which are directed to a method of producing a magnetic material having either a magnetized state or a demagnetized or a product of such type.

Withdrawal of any rejection based on Whetstone is requested.

Although Applicants believe for the reasons advanced above they have avoided the obviousness rejection based on Whetstone in view of Manning, Applicants wish to respectfully point out that Manning is directed to a permanent magnetic, namely, a material of hard magnetic characteristic. Again, such a material is quite distinct from a magnetic material in accordance with the present invention which has either a magnetized state or a demagnetized state irrespective of the presence of an external magnetic field, i.e., semi-hard magnetic characteristic.

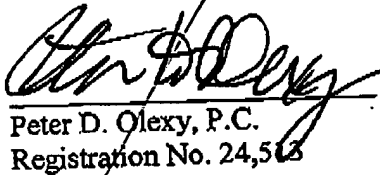
In overview, the prior art simply, Applicants submit, fails to teach or suggest major limits of the present invention.

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Again, the Examiner is requested to note the Request for Interview.

Withdrawal of all rejections is requested.

Respectfully submitted,


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